

From the Author

ON THE BAEI FRUIT AND ITS MEDICINAL
PROPERTIES AND USES.



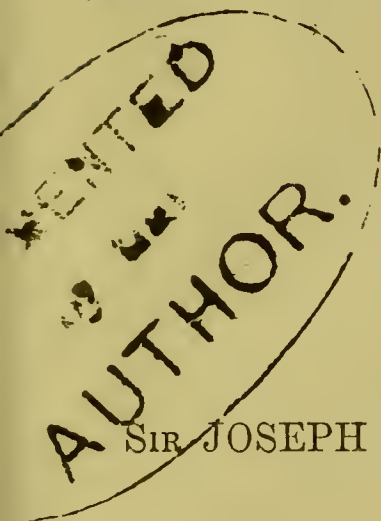
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ON THE

BAEL FRUIT

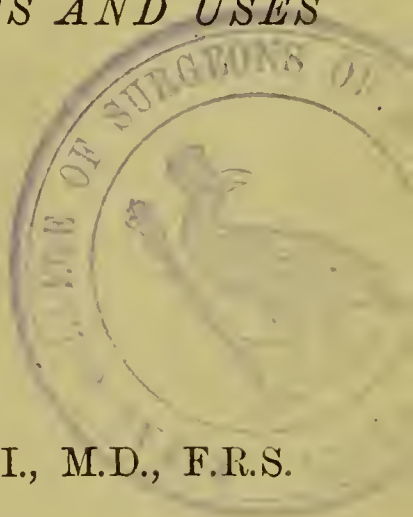
AND ITS

MEDICINAL PROPERTIES AND USES



BY

SIR JOSEPH FAYRER, K.C.S.I., M.D., F.R.S.



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ON THE
BAEL FRUIT AND ITS MEDICINAL
PROPERTIES AND USES.

GENTLEMEN,—I have recently, through the kindness of a friend, received from Calcutta some very fine specimens of the Indian bael fruit. They have arrived in perfect order, and as the opportunity seems a good one, I desire to take advantage of it by directing your attention to a remedy of considerable repute in India in the treatment of some forms of bowel complaint; and one also that I think might often be of use here in similar cases, especially in those forms of chronic diarrhoea and dysentery that are seen in persons who return to Europe after residence in India or other tropical climates.

The Bael is already well known to many in England, and is included in the list of drugs in the “British Pharmacopœia,” where it appears in the form of the dried fruit,* and the liquid extract, which is “prepared from the half-ripe fruit of *Ægle marmelos*, brought from Malabar and Coromandel”

* The specimen on the table is prepared by Mr. Squire.

—known in fragments of a brownish-orange-coloured dried pulp adhering to the rind of the fruit. It has been, says Mr. Squire in his valuable commentary on the Pharmacopœia, “extolled in the treatment of diarrhœa and dysentery, and is given alone or in combination with other astringents, such as the red gum of the *Eucalyptus rostrata*.”

This liquid extract of bael is prepared by macerating the dried fruit in water and rectified spirit. The fluid is to be evaporated, pressed, and filtered; an intensely brown fluid is the result, of which 3j. to 3ij. may be given as a dose. This and the dried fruit are the only officinal forms in which it is known (so far as I am aware) in this country; and though I do not wish to disparage them, for I really know little of their properties in this state, yet I imagine they have neither deserved nor acquired much repute as medicines. I think the case is different in regard to the fresh fruit and its preparations, and it is to them, therefore, that I wish to call your attention, for it is quite possible now, in these days of rapid communication, to procure constant supplies direct from India; and even though it should not maintain its value here as it does in the East, yet, as some of you will probably serve in India, it is well that you should be acquainted with a remedy that often proves valuable there. Do not suppose that I wish you to think of the bael fruit as an unfailing or actively specific remedy in acute disease; it is nothing of the kind, but simply one that is occasionally very useful in some forms of chronic disease, and successful where other remedies fail. It has the advantage, moreover, of being simple, common, and easily procured. Now, I am a great advocate for utilising the local remedies of the countries in which one may live, and would recommend you

to make yourselves acquainted with them as much as possible, not merely as a matter of economy, but because it renders you more independent of costly European drugs, and because it is right to develope and encourage the use of such as are really reliable and effective; and I can tell you that there are many native remedies that might with advantage be introduced into European practice. This is a consideration that I would urge on those especially who are likely to exercise their profession abroad; and it is one that I have recently pressed on Government, with the effect, I trust, of providing for the more general use of native indigenous remedies, and for the extended use of such European drugs as are found to be capable of cultivation or preparation in India.

The particular example to which I now invite your attention is the fruit of an aurantiaceous tree, known to botanists as the *Ægle marmelos*. It is common nearly all over India, and everywhere is held in much esteem, and indeed veneration. By the Hindoos it is regarded as a sacred tree, its ternate leaf being considered as a type of the Hindoo trinity, or of Sivà, a member of the sacred triad. It is, moreover, thought to be pervaded by the presence of Durga, or Kali, the wife of Sivà, and hence has a double odour of sanctity, and is much grown around pagodas and temples. It is valued not only on this account, but because its fruit, leaves, bark, and wood are all considered to be endowed either with medicinal properties, or to be of value in other ways. I propose to consider only the medicinal properties and uses of the fruit.

Descriptions of the tree may be found in most works on the trees and plants of India. Dr. Cleghorn—a high authority on all that regards Indian forest and plant life—has given

an account of it in the *Indian Annals of Medical Science*, and he tells us that it has many synonyms, of which the following are some:—*Ægle Marmelos* (Wight and Arnott), *Feronea Pellucida* (Roth), *Cratoëva Marmelos* (Linn), *Belva Bilva*, *Maridu* (Sir W. Jones in “*Asiatic Researches*”), *Cov-alum* (Rheade Hort. Malabar), *Bael*, *Bil*, or *Bela* (Hindi Bengali), *Beli* (Cingalese), *Naraidu* (Telinga), *Tanghala* (Malay), *Willamaram* (Tamul), *Bengal Quince*, *Stone Apple* (English).

In Bengal and Northern India, where I have known it, it is commonly called *Bael* or *Bel*.

The tree is moderately large—twenty, thirty, to forty feet high; the branches are irregular and not numerous. The leaves are ternate, and dotted like those of other orange trees; flowers are whitish and sweet-scented. It has sharp strong axillary thorns, which are more numerous in the wild, uncared-for, stunted trees growing on poor ground than in the cultivated trees, on which also the fruit are much larger and more highly flavoured than on the former. The fruit is, as you see, a large globose or obovate hesperidium or orange, of various sizes, from a small orange to that of the individual before you, with a hard, woody rind, with a fragrant aromatic epidermis. The interior is a yellowish aromatic and astringent pulp, with a pleasant and peculiar flavour. It contains ten to sixteen cells, each lodging a tomentose seed, embedded in a tenacious viscid transparent mucus, which has a peculiar, somewhat terebinthinate flavour. The rind is pungent and aromatic, with essential oil. As I have already remarked, the tree is sacred to Sivà, and the worship of this god, under the name of Mahadeo, is prevalent everywhere throughout India. “The daily ceremonies are of a severely austere and simple character,”

says Monier Williams ; “ water from a sacred river is poured over his symbol, with perhaps a few oblations of flowers, but often there is nothing presented by the worshippers but the Bilva, or bael leaf.”

The following is the best full description of the tree I can find, by Dr. Brandis, F.R.S., the Director-General of Forests in India :—

“ *Ægle Correa*.*—Leaves alternate, trifoliolate ; leaflets pellucid, punctate. Flowers bisexual. Calyx small 4, 5, dentate, deciduous. Petals 4, 5, imbricate. Stamens numerous, with short subulate filaments, and long linear anthers. Ovary on cylindrical disc, with a fleshy axis, and 10-20 small cells near the circumference, with numerous ovules in each cell attached to the central angle. Stigma capitate, obtuse, deciduous. Fruit globose, with hard, woody rind, 8-16 celled, filled with an aromatic pulp. Seeds numerous, oblong, flat ; testa woolly, covered with a viscid fluid. I. *Æ*. Marmelos, Correa ; Roxb. Cor. Pl. t. 143 ; Fl. Ind. ii. 579 ; Wight and A. Prodr. 96 ; Wight Ic. 16 ; Bedd. Fl. Sylv. t. 161. The *Bael* tree—Sanskrit *Bilva*, *Mahura*. Vernac., *Bel*, *bil*, *bila*, *bili*. Local name *Mahaka-marra*, Gonds., C. P. ; *Ushitben*, Burm. Glabrous, armed with axillary, straight, strong, sharp spines one inch long or more. Leaflets three, rarely five, ovate-lanceolate, crenate, terminal long-petiolulate, lateral nearly sessile. Flowers greenish-white, with a fine honey scent, on short lateral panicles ; pedicles and calyx pubescent. Calyx flat, teeth indistinct. Petals oblong, coriaceous, thickly dotted. Filaments occasionally fascicled. Fruit

* The dried specimen of the plant now before you has been kindly lent me by Sir Joseph Hooker, K.C.S.I., P.R.S., from the Kew Herbarium. The fresh fruit were sent to me by Mr. W. Gibbons, of Calcutta ; they came by a Canal steamer, and arrived last March.

globose, oblong, or pyriform, two to five inches diameter, with a smooth grey or yellow rind, and a thick orange-coloured, sweet aromatic pulp. Wild in Siwalik tract and outer Himalaya, ascending to 4000 feet, from the Jhelum to Assam; also in Oudh, Behar, Bengal, Central and Southern India, and Burmah. Often gregarious when wild. Cultivated throughout India, except in the northern part of the Punjab; frequently planted near Hindoo temples. Leaves shed about March and April; the new foliage appears in April and May. Flowers about May; and fruit ripens in October, November; remains long on the tree. When cultivated, a middle-sized tree to thirty-five feet high, with a short, erect, often fluted, irregularly-compressed, and scooped-out trunk, attaining a girth of seven feet; branches few, extremities often drooping, forming a narrow oval head. Wild (in North-West India), generally a small scrubby tree. Bark of trunk and larger branches half an inch thick and more, outside soft, corky, light cinereous or bluish-grey, with large dark stains, and irregular, longitudinal, shallow furrows. Wood light-coloured, mottled with darker wavy lines and small light-coloured dots; medullary rays indistinct; even, close-grained, forty to fifty pounds per cubic foot. The tree, being valued for its fruit, is not often felled; but the timber is esteemed for strength and toughness. Used in construction for pestles of oil and sugar-mills, naves and other parts of carts, and for agricultural implements. Twigs and leaves are lopped for cattle-fodder. The tenacious pulp of the fruit is used medicinally in diarrhoea and dysentery, as sherbet, and as a conserve (Pharm. Ind. 46). Dry, it keeps well as a hard, transparent substance. It is also considered as an excellent addition to mortar, especially in building walls. Snuff-boxes are made of the shell of the

fruit ; the leaves, root, and bark are used in native medicine ; from the flowers a scented water is distilled.

In 1868 a Pharmacopœia for India was published, under the auspices of Government, edited by Dr. John Waring, a distinguished member of the Madras Medical Service. This valuable work is based on the British Pharmacopœia, and, while affording all the information contained in that work of practical use in India, embodies and combines with it such supplementary matter of special value in that country as should adapt it to meet the requirements of the Indian Medical Department. In this work the following description is given of the forms in which Bael is prepared for use :—

1. Bael Mixture (Sherbet) : “Two ounces of the pulp, two ounces of white sugar, four ounces of water ; mix them thoroughly and add ice ; it may be strained through linen, and is an agreeable form in which to take it, and is so taken by many in India when the bowels are deranged ; for its beneficial action in giving tone to the intestinal tract. It is generally taken early in the morning, and may be repeated twice or thrice daily to the extent of a large wineglass or small tumbler full.” *

Waring says : “It possesses all the aroma of the fruit, and when prepared with ripe fruit is not only astringent when diarrhœa exists, but possesses the singular property of being aperient if the bowels be irregular or costive. When the patient is much reduced in strength, and the stomach is irritable, the above mixture sometimes disagrees. It might then be given in smaller and repeated doses, and if these are rejected the extract *may* be tried.”

* Sherbet thus made from the fresh bael fruit—made as it is used in Calcutta—by Mr. Squire, was exhibited to the class.

The Liquid Extract (Ext. Belæ Liquid.): "Take bael fruit 1 lb., water 12 pints, rectified spirit 2 fluid ounces; macerate the bael for twelve hours in one-third of the water, pass off the clear liquor; repeat the maceration a second and third time for one hour in the remaining two-thirds of the water; press and filter the mixed liquors through flannel, evaporate to fourteen fluid ounces, and when cold add the rectified spirit"; dose from one to two drachms. This extract, prepared from the dried bael imported into England, appears to possess much less medicinal power than the extract and mixture prepared from the fresh fruit in India.

This, indeed, is the preparation of the British Pharmacopœia about which I have already expressed doubts as to its activity.

The Extract of Bael (Extract. Belæ), made from fruits that are ripe and have thin shells or rinds: "Extract the pulp, place it in a vessel, add water sufficient to cover it, stir for two hours, and strain through stout calico. Repeat the process until the fluid which passes is tasteless; evaporate over a water-bath to the consistence of a soft extract." This preparation retains all the aroma of the fruit. Dose from half a drachm to one drachm, twice or thrice daily. It is said to keep better if made from the unripe fruit.

There are other forms in which it is administered, and I will mention the most important of them.

Mr. A. Grant, of the Bengal Medical Service, describes several (in a paper in the *Indian Annals*, vol. ii. of 1855) in use in Bengal; for example:—

"The unripe fruit, squeezed and kept exposed to the air for a whole night, is then boiled and strained and sugar added. Of this a wineglassful is taken twice a-day." He

says the bael is known to be carminative in the form of preserve or syrup.

The syrup is prepared thus:—Pulp of bael and sugar, each 2 tolas = 3 xj.; Eusophgool (*Plantago Isphagoola*) bran, 6 mashas = 3 jss.; rose water or confection of roses, 1 tola = 3 vj.; water a wineglassful; mix; give three or four times a-day.

In dysentery the following formula is used:—Bael mixed with dried shell of *Garcinia mangostana*, 4 mashas = 3 j.; flour of pomegranate, 4 mashas = 3 j.; syrup of bael, 1 tola = 3 vj.; mix for a dose three times a-day. As to the use of the bael sherbet I have already described, Mr. Grant makes the following remarks, in which I quite concur:—
“It is not only astringent, but possesses the property of being aperient if the bowels are irregular or costive; this last quality it seems to derive from being stomachic and promoting assimilation. When the patient is much reduced in strength, and his stomach weak, the sherbet sometimes disagrees; it ought then to be given in smaller doses.”

Bael marmalade, according to Mr. Grant, is prepared in the same way as orange marmalade. It is eaten on bread, and is said to keep well.

Dr. J. Jackson gives the following recipe for bael conserve:—Take forty bael fruit, pass the pulp through fine muslin (no water to be added), take six seers (12 lbs.) of fine white sugar, boil it into syrup, then add the bael, and boil them together over a slow fire until the whole is made into a jelly.

“But,” says Mr. Grant, “as at times, however, all the above preparations will, either from their bulk or sweetness, disagree with the patient, it becomes an object to obtain the

medicine in a more concentrated form, more convenient for prescribing." Accordingly, Mr. Scott, of the Government Dispensary in Calcutta, devised the following formula for an extract, which Mr. Grant says he tried with favourable results. This extract will keep for any time ; it retains the aroma and taste of the fruit and its medicinal principles, the starch and other insoluble portions of the fruit only being rejected. Its consistence is uniform, like molasses ; its colour dark brown ; its smell that of bael. The dose is from 3 ss. to 3 j. two or three times in the day, or even oftener. It should be used recent, but he thinks it does not keep so well as stated by Mr. Scott. The extract prepared from the unripe keeps better than that from the ripe fruit. This is the formula :—Take the pulp of the ripe fruit with their shells, put it into a vessel and cover it with water ; then churn it as you would churn butter for a couple of hours. Throw this on a calico strainer, and when the whole of the clear solution has passed through, replace the contents of the strainer in the vessel with half the quantity of water, and churn again for a couple of hours ; filter as before, and continue to do so until the liquid passes through the filter tasteless. While the process is going on, bruise the shells of six bael and boil them well in two pounds of water, filter the solution through the calico strainer, add to it the filtered solution of the fruit, and having put the mixed solution in an evaporating dish over a water-bath, evaporate them down to the consistence of a good extract. If the medicinal properties of the bael depend on the tannin it contains, this extract, which is made only from the soluble portion of the fruit, must contain it also in all its integrity.

Mr. Scott gave also a formula for concentrated syrup as

follows:—One ounce of the extract dissolved in twenty ounces of water, adding eight or ten ounces of sugar-candy; then evaporate it in a water-bath to the consistence of a syrup. The late Dr. Chuckerbutty, Professor of *Materia Medica* in the Medical College of Calcutta, recommended a preparation of dried bael to be used when the fresh fruit is not procurable, which is the case for some time each year. The pulp is strained through a coarse sieve, and is then kneaded into cakes and baked, to be eaten like a biscuit. This contains all the astringent properties of the fruit, it is said. This process of preparing the dried bael was devised by Mr. Bowser, the energetic and intelligent Steward of the Calcutta Medical College Hospital.

Other preparations are sometimes made with the bael after it has been partially roasted; and the Hakeems and Kobirajes, I believe, prefer to use it in this form. Dr. Chuckerbutty occasionally recommended the use of the burned bael in the treatment of bowel complaints.

Dr. O'Shaughnessy, in the "*Bengal Dispensatory*," says:—"The statements we find in works on Oriental *materia medica* are very various as to the qualities of this tree and its products. Rheade says a decoction of the bark of the root is considered in Malabar to be very useful in hypochondriasis melancholia and palpitation of the heart; and that the leaves are used in decoctions in asthmatic complaints. The same authority says that the unripe fruit is of use in diarrhoea.

"Among the Javanese the fruit is deemed very astringent. Roxburgh correctly states the fruit to be delicious to the taste and very fragrant."

In the "*Asiatic Researches*," vol. ii., page 349, it is stated that "the fruit is nutritious, warm, and cathartic (a curious

combination of qualities), its taste delicious, its fragrance exquisite. Its aperient and deterative qualities, and its efficacy in removing habitual costiveness, have been proved by constant experiments. The mucus of the seeds is for some purposes a very good cement." It is, indeed, remarkable how hard the mucus becomes when dry.

In the *Transactions of the Medical and Physical Society of Bengal*, vol. iv., page 110, Baboo Ram Comul-sen gives an account of the uses of the fruit and various parts of the plant. His botanical description is that given by Dr. Carey, and the following is an extract from the work referred to, giving it in detail:—

"In Bengal the parts of the tree which are employed are the bark, the root and stem, the leaves, and the fruit, both immature and ripe. The bark of the tree is peeled whilst fresh, and a decoction of it is made, in the proportion of two tollas, or about an ounce, to eight chittacks, or about a pint, of water. It is boiled to one-fourth, and administered in bilious fevers.

"The bark of the tree is sometimes used in fever, but rarely alone, being more usually one of those mixtures which are known as combinations of fourteen or eighteen substances, and given in remittents. When used alone, it is given in a similar decoction as the bark of the root.

"The expressed juice of the leaves, diluted sometimes with a little water, is commonly given in colds and incipient fevers, when the patient complains of general dulness, pains in his limbs, and sense of fulness of the stomach. The juice is slightly bitter and pungent, and induces perspiration.

"The young leaves are also used in ophthalmia, and are made warm, and so applied to the eyes, to relieve pain and in-

flammation. The unripe fruit is cut into small slices and dried, and a decoction is formed of the dry pieces by boiling them in the same proportion as the bark. It is in this preparation that the medicinal properties of the plant are most decidedly manifested; and the decoction of the dried unripe fruit is a most valuable remedy in diarrhœa and dysentery. It is particularly serviceable in the bowel complaints of children, but is also of benefit in several stages of such diseases in adults. The other forms in which the fruit is employed belong rather to diet than medicine, but they deserve to be noticed as employed in such disorders. A preserve is likewise prepared from the fruit before it is ripe, by boiling with syrup, which is also given to patients labouring under bowel complaints, with benefit, when every other article of food is the cause of fresh excitement, and attended with a feeling of oppression after being taken into the stomach. The ripe fruit is also beneficial in the same way: a sort of sherbet is prepared from it with tamarind-juice, which has rather an opposite effect, but it is on that account beneficial in fevers and inflammatory affections attended with thirst. The glutinous matter about the seeds is used by planters as a size and varnish. The bael is not the less esteemed by the Hindoo that the tree is held particularly sacred to Mahadeo, and is always worshipped at festivals celebrated in honour of him or his spouse, at the Durga Pooja holidays and similar celebrations."

The medicinal virtues of this plant are probably due to the astringent, aromatic, and demulcent properties of the pulp. It contains a considerable quantity of tannin, essential oil, balsam, and aromatic principle in the pulp, in the rind, and in the tenacious mucus surrounding the seeds. These may be preserved to a certain extent in the dried pre-

paration, but the fresh fruit is in all respects better and more active, and as it can be so readily imported, there is no reason that I know of why it should not be brought into use. There can be no doubt that the bael is a very ancient remedy among the native physicians of India, albeit Dr. Wise does not refer to it in his "System of Hindu Medicine." It is referred to in the Ayur Veda, the book of Sushruta, a Hindoo System of Medicine, dictated to him by the "holy sage and physician Dhanantwari"—a work still of great authority among Hindoos. It continues to be a favourite remedy among medical men of all denominations in India in the treatment of chronic bowel complaints, and it is not unfrequently given in combination with astringents, such as the kutch or catechu. The specimens before you, which have been in England since March, and are perfectly fresh at the end of May, are remarkably fine ones, and rather larger than those commonly met with (they have been evidently selected) in the Indian bazaars. You will recognise the peculiar fragrant aromatic odour, the yellow colour of the pulp, and the viscid mucus surrounding the seeds, which, Dr. Brandis tells us, is used for various industrial as well as medicinal purposes; a great contrast with the dry form in which the fruit is generally imported, and as you see it here. Mr. Squire has kindly undertaken to reinvestigate the question in its pharmaceutical aspects, and I trust he will succeed in adding some useful preparations of this fruit to our list of remedial agents, and that both in the fresh and preserved conditions it will be brought into use in England.

The bael is not, as you will have gathered from what I have said, confined to the pharmacy of the Hakeems and Kobirajes (*i.e.* the Mohammedan and Hindoo physicians); it is much used by European medical men, and I have given

you most of the formulæ in which it is administered. I will not occupy your time by much further detail on this subject, but may just say that, in addition to the authorities I have already mentioned, others have written on the subject, and if you care to do so you will find descriptions of the plant by Pereira in the *Pharmaceutical Journal*, vol. x., page 165; by Sir R. Martin in the *Lancet* of July, 1853, page 53; by Dr. Horsefield in the *Transactions of the Batavian Physical Society*, vol. viii., page 25, and by various learned authors of the last two centuries, such as Burmann, Bontius, Garcias ab Horto, and Caspar Bauhin. Descriptions of the plant and its uses are also to be found in the works of Roxburgh and Wight, Shortt, Newton, Green, Bose, Bidie, Pogson. In a paper entitled "Remarks on the Indian Bael or Bela in Dysentery, Chronic Diarrhœa, and Dyspeptic Disorders," by J. Adolphus, published in London in 1853; also in "Notes on the Nature and Uses of the Indian Bael," by H. O. Renfry, London; Bibl. Manchester Medical Society, 1855; also "Bael ou Bilva, Fruit de l'Ægle Marmelos," A. Collas, *Revue Coloniale*, August, 1856. Dr. Macnamara, late Professor of Chemistry in the Calcutta Medical College, has also recorded an examination of the fruit, in which he compares the ripe and the unripe fruit, in reference to the proportions of tannin or other astringent principles contained in each, and in which he states that the ripe contains more tannin than the unripe fruit, in the proportion of five to three. It contains more sugar, more of the bitter principle and vegetable acids not tannic. He obtained also, by means of ether, a balsam having a strong odour, closely resembling that of Peruvian balsam. This exists in much larger quantities in the ripe than the unripe fruit. He says the astringent properties are due to tannic acid, and that the

ripe fruit, containing more of this than the unripe fruit, is more potent.

Dr. Macnamara suggests that the good effects of the bael may be due to the tannin and the balsam. His remarks on this head are important:—"May not the astringent effects of the bael be due to the tone which it gives to the coats of the intestines, and to its balsam rendering the secretions of the mucous membrane more healthy? It would then decrease the number of stools in a dysenteric patient, or in an otherwise healthy one, but who is liable to mucous diarrhœa; while in a person of constipated habit, given to good feeding, bael might act as a laxative, by keeping the mucous secretions healthy, preserving the tone of the muscular coat, and so enabling the intestines, liable to irritation by peccant matters, to expel the crudities—nay, probably such people would be very liable to diarrhœa if they intermitted the bael; and so, even with them, the bael may really be an astringent."

Sir R. Martin, alluding to the composition of the bael, says in the *Lancet* (in regard to an analysis of the fruit by Mr. Henry Pollock) that "the pulp and the hard shell of the fruit do not appear to differ chemically in any respect except as to quantity. They both contain—(1) tannic acid; (2) a concrete essential oil; (3) a bitter principle which is not precipitated by tribasic acetate of lead, and a vegetable acid. The pulp also contained a considerable quantity of sugar, in which it was preserved. All three of the substances I have mentioned exist in the largest quantities in the rind. There is most acid in the pulp."

Many medical officers in India have used this remedy in their practice, and generally have recommended it. The most elaborate and instructive paper on the subject is that by Mr. A. Grant, in the *Indian Annals*. Dr. Annesley,

Dr. Jackson, Sir R. Martin, Dr. Waring, Dr. Duncan Stewart, Dr. E. Goodeve, Dr. Moir, Dr. Chuckerbutty, Dr. Cleghorn, and others have borne testimony to its value as a remedy in chronic dysentery, in diarrhœa, in some dyspeptic conditions, and in bowel complaints of children. I shall refer to some of their remarks on the subject, and then, in conclusion, briefly notice the conditions of disease in which I think the bael is likely to be useful in Europe.

Mr. A. Grant says:—"Given in the form of sherbet, it acts as an aperient to persons subject to habitual constipation; a small tumblerful taken in the morning will produce action of the bowels. In cases where dyspepsia is accompanied by obscure symptoms of land-scurvy, it seems to act favourably, and produce alterative as well as antiscorbutic effects." To this I may add, on my own part, in the irregular action of the bowels, diarrhœa alternating with constipation, when the abdomen is distended, the appetite bad, the secretions defective, and the nervous system depressed, as one so often sees in the damp, tepid atmosphere of Bengal, especially towards the end of the rains, when the mucous membrane of the intestinal canal is disordered and in a state of atony, the bael is not unfrequently an effective remedy, and, at all events, gives some relief, acting either as a laxative or tonic, according to circumstances, by stimulating the bowel to more healthy action, and, combining with the ingesta, seems to promote digestion and assimilation. In the low and chronic forms of diarrhœa, among the weak and exhausted from whatever cause, whether as the sequel of malarious poisoning, fever, or dysentery, it may prove of benefit where opium and ordinary astringents have failed; or it may be still more beneficial in combination with these remedies; and

Mr. Grant says that when he wanted to produce a more stimulating effect in asthenic cases, he combined it with the tharrie or palm spirit. He mentions several cases of subacute dysentery successfully treated.

Dr. John Jackson, Dr. Duncan Stewart of Calcutta, and Sir R. Martin have borne similar testimony to its utility, not only as an astringent, but as a preventive of diarrhœa in persons subject to that complaint, and also as a valuable agent in the treatment of some of the more chronic forms of dysentery. Dr. Jackson speaks favourably of its value in the treatment of the diarrhœa that sometimes follows cholera.

Dr. Cleghorn says it has proved useful not only in obstinate diarrhœa, but in the irritability of the mucous membrane of the intestine that followed the expulsion of tœnia by kousso. Mr. Sanderson, a distinguished medical officer of Madras, speaks well of it.

Sir R. Martin made the following remarks:—"On what the curative property depends I know not; it is certainly not astringent to the taste, or at all events very slightly so. I am inclined to believe that much of its efficacy may reside in the thick mucilage which surrounds the seeds of the fruit. A singular property of the fruit is this, that it does not merely restrain undue action of the bowels, as in diarrhœa and dysentery, but also in cases of obstinate habitual constipation acts as a mild and certain laxative. It may in all cases be said *to regulate the bowels*."—*Lancet*, July, 1853, page 53.

Dr. Moore, of the Bombay Medical Department, who, at the instance of Government, has written a popular work on Medicine, for the use of persons away from medical aid, for which he received the reward offered for the best essay, says:—"It acts as an astringent to the mucous membrane

of the bowels, and is also slightly aperient, a union of qualities not found in other astringents. It is useful in chronic diarrhœa and dysentery."

In the March (28) number of the *Indian Medical Gazette*, I find the following remarks by an officer, who—as is often the case in India—being left to his own resources for medical assistance, had been obliged to fall back on such knowledge as he had, or could gather from books, and treat as he best might the complaints occurring in natives or others who were serving under him in that particular locality. India is not a country for specialists, and men holding responsible offices are often obliged to be their own doctors. The writer is Colonel Parsons, Deputy Commissioner of Gujerat, in the Punjaub:—

"My attention was first called to the subject some years ago by a brother officer when I was stationed in a very damp district, where diarrhœa and dysentery were not uncommon complaints. I was myself attacked with the latter form of disease, which rapidly disappeared under bael treatment. Since then I have frequently been in localities where European medical officers were not always present, and I have suggested and administered the same remedy to both Europeans and natives suffering from either of the above complaints, and invariably the bael has caused most satisfactory results.

"The subject of the use of bael is not by any means a new one, and I believe the fruit is extensively used for medicinal purposes by Presidency surgeons; but as far as my experience goes, it might with great advantage be much more used in Upper India for the above complaints than it is at present. I feel sure that a great deal of mortality in English regiments from the scourge of dysentery would be saved by the free use of bael fruit, as I have found its effects absolutely

marvellous, both as regards rapidity of action and effectual cure. I believe that Pogson's preparation of bael was tried in the army; but I am not aware whether it was considered efficacious. I did not find it of use. The fresh fruit is the best form, but that is not always procurable. I have, however, found Bathgate's dietetic bael all that could be desired in the absence of the fresh fruit. The mode of administering the fresh fruit I have always adopted is to strain the juice from the pulp through muslin, add a little water and sugar; it then makes a very palatable drink. Two baels a day (this applies to small ones), of the size of an orange, one in the early morning, the other in the evening, I have found sufficient to effect a cure in a very few days, provided animal food be avoided or very sparingly used."

I might easily add to these attestations in its favour, but it would be tedious and wearisome to do so. I will just remark that you may observe that all tell much the same story, and declare it to be a valuable remedy in certain chronic diseased conditions of the *primæ viæ*; but by none is it regarded as a remedy for acute disease. It is a mistake, not unfrequently made, to give remedies at the wrong time; and this is sometimes done in the case of bael, which consequently has been unjustly blamed for not doing that to which it never had any pretensions. As a remedy in chronic disease it may be of much value, but it is useless in the acute forms. The conditions in which it is likely to be useful in India, I have already indicated; and I must now bring these remarks to a close with a brief description of the cases in which, if the fresh fruit can be imported, or if the pharmacutists can make us an active preparation, it is likely to be useful here.

In the chronic condition of dysentery into which the bowel is apt to pass when it is thickened, perhaps ulcerated and indurated from cicatrisation, and subject to frequent recurrence of subacute inflammation and dysenteric action, indicated by straining and the discharge of mucus and blood, and where the entire intestinal mucous membrane is sympathetically involved, the use of the fresh bael taken in the form of sherbet is likely to be of service. It will not always alone be sufficient, and it may be necessary to combine it with other remedies, such as opium or Dover's powder, but as an adjuvant to these or to astringents it may be beneficial; and from the power it possesses of giving tone to the alimentary canal generally, of improving the condition of the mucous membrane and its glandular apparatus, and of favouring cicatrisation, it will not unfrequently aid in producing satisfactory results where other remedies have failed. Vegetable and metallic astringents and tonics, such as kino, catechu, tannin, hæmatoxylon, eucalyptus, Wrightii anti-dysenterica, pomegranate, sulphate of copper, acetate of lead, alone or combined with opium, frequently give temporary relief, though ultimately they prove insufficient; the disease continues to advance, and the patient to lose ground; the least error in diet, or alteration in temperature or in the hygrometric condition of the air, aggravating the symptoms until change of climate is resorted to. Such cases are not infrequent here, and may be seen on board the homeward-bound steamers and at English and Continental health-resorts. No doubt they have taken the wisest and most effective step for restoration of health in coming home—one in comparison with which drugs are insignificant. In such cases the bael is indicated, and I believe would often materially aid in restoring the diseased intestine to its normal condition.

Of course it is not likely to meet all the morbid conditions that may arise in cases of chronic dysentery, and I need hardly remind you that any recurrence of acute symptoms may need active treatment by ipecacuanha, Dover's powder, injections of opium in solution of gum or arrowroot. In the chronic states of which I speak, I think you will find under its influence that the reparative changes in the large intestine progress quietly and favourably, until cicatrisation is accomplished, thickening is removed, and, as far as may be, tone, vigour, and healthy action are restored.

But, unhappily, many cases have not this favourable termination under any circumstances, and the result is fatal, after long and severe suffering; the structural changes in the bowel are beyond repair, and the patient succumbs. In other cases the disease, though not fatal, is very tedious; the cicatrix may be formed, but the gut remains thickened, indurated, and contracted, by loss of the mucous membrane from dysenteric sloughing; the functions of the bowels are imperfectly performed; a condition of chronic disease and suffering remains, diarrhœa, sometimes dysenteric in character, continues, and the patient is worn and wasted by continued suffering. The evacuations are light-coloured—grey, sometimes yellowish; often passed without pain or tenesmus; but at times accompanied by both, and mingled with blood and mucus. These conditions ultimately undermine the strength, and the patient may sink from exhaustion. In the stages that lead to this state of things the bael is more likely to be of service in retarding, if not of altogether checking, the mischief, than remedies that have a more directly astringent action.

Chronic cases of dysentery of a milder character not unfrequently come under our notice. There is thickening

and perhaps contraction of the large intestine, which may be felt through the abdominal wall, with or without tenderness on pressure. The general health may be improving, indeed, may be fairly good (the appetite, too, good); and all seems comparatively well, except that the bowels are irregular—sometimes confined, at others relaxed. There is straining, and the evacuations are mingled with mucus and sometimes blood. The patient suffers much at times, and is in constant danger of relapse. In this state diet is of the utmost importance; the bowels should be kept regular with occasional doses of oil, or the tepid-water enema. No active drugs are needed, but in such cases the bael sherbet would, I think, be often useful.

Again, either as a sequel of dysentery, or altogether independent of it, an intractable and obstinate form of diarrhœa is met with, especially in persons who have been long in India, China, or other tropical and malarious climates. The diarrhœa sometimes called “alba, or white flux,” described by Mr. A. Grant in the *Indian Annals*, is a painless disease, characterised by frequent, liquid, light-coloured, frothy motions, which gradually reduce the strength and exhaust the vital energy. The person slowly wastes and becomes anæmic, his skin is harsh and dry, his abdomen tumid, the tongue red and dry, the papillæ gradually shrink, until in the later stages they disappear altogether, and the tongue becomes smooth, polished, and glazed, or it is coated with white layers of epithelium, which also form on the mucous membrane of the mouth and fauces, often accompanied by aphthous spots.

There is not necessarily evidence of structural changes in the liver or spleen; indeed, there is reason to believe that these organs only share in the wasting or shrinking of

the body generally; and so it is found in fatal cases; and also that the whole intestinal tube is thinned, almost transparent, the mucous membrane softened, and the glandular structures wasted or destroyed; not unfrequently a certain amount of ulceration being observed, especially towards the lower portion of the ileum and in the large gut.

Digestion, absorption, and assimilation are all interfered with, and gradual wasting from inanition results. This condition of disease is frequently seen in the hill stations of India, but most generally in those persons whose constitutions have already been damaged by long residence in the plains. It is also seen in some who have never been in the hills at all.

Early removal to another climate is the best, and, indeed, the essential remedy; and it is, I believe, absolutely necessary in many cases, to save life. The great mistake generally made is of not resorting to it sufficiently early, and before progressive degenerative changes have gone so far as to be irreparable. In this form of diarrhœa, diet is a most important element in the treatment, and it should be of the blandest, most unirritating kind—milk, animal butter, farinaceous food—which will not always agree, and careful abstinence from over-stimulation either by alcohol or any other form. All forms of medicine have been tried with more or less good effect—opiates in small and repeated doses, either as laudanum or Dover's powder, often giving the greatest and most enduring relief; astringents at times being beneficial, but often failing miserably to do any good.

Now, in such cases, before they leave India, it has sometimes been found that the fresh bael sherbet has produced excellent effects, and done more good than any other remedy. Such are far from uncommon in England in the cases of

Indian officers or others, who come home for the purpose of shaking off a complaint that they find is steadily getting worse in India; and it is with the hope of providing a remedy for such that I am anxious this popular Indian remedy should be better known and more used in England.

After all, medicine of any kind, however efficacious, is of secondary importance to change of climate, carefully regulated diet, and scrupulous avoidance of chills and cold by extra warmth of woollen dress, which should never be neglected. A remedy that has often produced happy results in India, could hardly fail, I think, to be even more satisfactory here, where it would have the advantage of the improved climate and other conditions of life to give effect to its beneficial action.

I have given you but a mere outline of the diseased conditions in which the use of bael may be advocated; but my object was rather an account of the remedy than a clinical lecture on the diseases in which it is useful. And as I have already, I fear, exhausted your patience, I must conclude by saying that, though the subject has been rather a dry one, yet I hope it has not been altogether uninteresting.

